SYSTRON DONNER

INSTRUCTION MANUAL

MODEL 400/411
FUNCTION GENERATOR

DATA PULSE
55

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SYSTRON DONNER CORPORATION

CONCORD INSTRUMENT DIVISION
10 Systron Drive • Concord, California 94518 • U.S.A.
Tel: (415) 676-5000 • TWX: 910-481-9479 • Cable: SYSTRONDONNER
FSCM No. 52542

Printed in U.S.A.

SYSTRON DONNER
CORPORATION

WARRANTY

Systron-Donner instruments are warranted during a period of one year from date of shipment to original purchaser to be free from defects in material and workmanship. This warranty does not apply to vacuum tubes, except as these are warranted by tube manufacturers. The liability of Seller under this warranty is limited to replacing or repairing any instrument or component thereof which is returned by Buyer, at his expense, during such period and which has not been subjected to misuse, neglect, improper installation, repair, alteration, or accident. Seller shall have the right to final determination as to the existence and cause of a defect. In no event shall Seller be liable for collateral or consequential damages. This warranty is in lieu of any other warranty, expressed, implied, or statutory; and no agreement extending or modifying it will be binding upon Seller unless in writing and signed by a duly authorized officer.

RECEIVING INSPECTION

Every Systron-Donner instrument is carefully inspected and is in perfect working order at the time of shipment. Each instrument should be checked as soon as received. If the unit is damaged in any way, or fails to operate, a claim should immediately be filed with the transportation company.

REPAIRS

Whenever a Systron-Donner instrument requires service, the nearest Systron-Donner representative should be contacted; all representatives will provide immediate service or arrange factory returns when necessary.

Please specify both model and serial number in all correspondence concerning Systron-Donner instruments. Address all inquiries on operation or applications to your nearest sales representative; or, Sales Manager, Concord Instrument Division, Systron-Donner Corporation, 10 Systron Drive, Concord, California 94518.

SYSTRON DONNER
Instrument Division
10 Systron Drive • Concord, California 94518 • Phone (415) 825-9810 • TWX 910-481-9479

Thank You.

We appreciate your confidence in our products. Systron-Donner wishes to ensure your on-going satisfaction with this instrument by maintaining it at its specified performance throughout its warranty period. If assistance is required, please feel free to contact one of our Factory, Regional or Local Service Centers listed on the reverse side of this card.

If service, calibration or parts are required beyond the warranty period, please contact the Service Center nearest you. They will insure your continuing satisfaction with our equipment.

To insure complete warranty coverage of this instrument and to help us serve you better, please complete the warranty registration card below and return it immediately.

Sincerely,

Neil Harrer

Neil A. Harrer
Product Manager, Customer Service

The Post Office will not deliver mail without proper postage

Systron-Donner Corporation
Instrument Division
10 Systron Drive
Concord, CA 94518

S-D Service Centers

Factory Service

INSTRUMENT DIVISION
10 Systron Drive
Concord, CA 94518
Phone: (415) 825-9810
TWX: 910-481-9479

REGIONAL SERVICE CENTERS

EAST
115 Grand Avenue
Englewood, NJ 07631
Phone: (201) 871-3916
(201) 871-3917

LOCAL SERVICE CENTERS

WASHINGTON, D.C.
7643 Fullerton Road
Springfield, VA 22153
Phone: (703) 451-6500

SOUTHWEST
312 N. Central Expressway
Suite 212
Richardson, TX 75080
Phone: (214) 231-5693

Warranty Registration Card

MODEL NO. _____ SERIAL NO. _____ DATE RCV'D _____

Company _____ Department _____

Name _____ Title _____

Address _____ Phone (_____) _____

City _____ State _____ Zip _____

PRE-SALE ASSISTANCE	DELIVERY	INSTRUMENT PERFORMANCE	INSTRUMENT QUALITY
☐ Excellent	☐ Early	☐ As Expected	☐ Excellent
☐ Fair	☐ On Time	☐ Good	☐ Fair
☐ Poor	☐ Late	☐ Defective	☐ Poor

SERVICE CONTRACT AFTER WARRANTY? ☐ Yes ☐ No ☐ Check Later

PROVISIONING PARTS REQUIRED? ☐ Yes ☐ No ☐ Check Later

THIS EQUIPMENT WAS TO: ☐ Replace existing instrument ☐ Expand equipment capability

WHAT INFLUENCED YOUR DECISION TO BUY? ☐ Advertising ☐ Salesman ☐ Other

COMMENTS: _____

SYSTRON DONNER CORPORATION

ADDENDUM

Model 400

Drawing No.			
37001-414 B		Delete item 115:	Resistor, R326 301 ohms, 1/4 W 1%, P/N102191.
		Change item 119 from:	Quantity 1, Resistor, 221 ohms
		to:	Quantity 3, Resistor, 221 ohms
		add:	reference design R326.
40000-545 C		Change R326 from:	301 ohms, 1%
		to:	221 ohms, nominal value, factory select.
37001-414	(1)	Change R381 from:	500Ω IT Pot. 106071
40000-545		to:	500Ω 4T 106144 or 102163
	(2)	delete:	Q322 and Q323 (DP633)
		add:	(1) MD1120, Q322 103205
	(3)	delete:	Q371 and Q372 (DP633)
		add:	(1) MD1120, Q371 103205
	(4)	add socket:	(102434) Under Q373
		add heat sink:	(106951) to Q373
	(5)	add:	3 pF (106492) C377, Across R379 on Circle Side F. S. at test.
	(6)	change:	R211 from 82Ω to RXX
	(7)	change:	R376 from 2.5k to 2k, 102164
	(8)	change:	C323 from 1500 pF 500 V 5% Part #100150
		to:	2500 pF, 500 V 5%, 106404, Nominal value factory selected.

Effective Date: 11-25-74

SYSTRON DONNER CORPORATION

ADDENDUM

Model 411

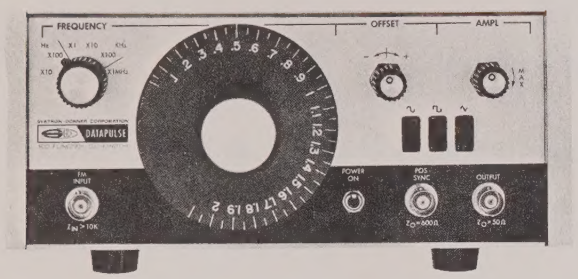
Drawing No.

37001-463	Delete item 115:	Resistor, R326, 301 ohms, 1/4 W, 1%, P/N102191
	Change item 119 from:	Quantity 1, Resistor, 221 ohms
	to:	Quantity 2, Resistor, 221 ohms
	add:	reference design R326.
37001-463	(1) Change R381 from:	500Ω IT Pot. 106071
	to:	500Ω 4T 106144 or 102163
	(2) delete:	Q322 and Q323 (DP633)
	add:	(1) MD1120, Q322 102305
	(3) delete:	Q371 and Q372 (DP633)
	add:	(1) MD1120, Q371 103205
	(4) add socket:	(102434) Under Q373
	add heat sink:	(106951) to Q373
	(5) add:	3 pF (106492) C377, Across R379 on Circle Side F.S. at test.
	(6) change:	R211 from 82Ω to RXX
	(7) change:	R376 from 2.5k to 2k, 102164
	(8) change:	C323 from 1500 pF 500 V 5% Part #100150
	to:	2500 pF, 500 V 5%, 106404, Nominal value factory selected.

Effective Date: 11-25-74

DATAPULSE DIVISION
SYSTRON DONNER

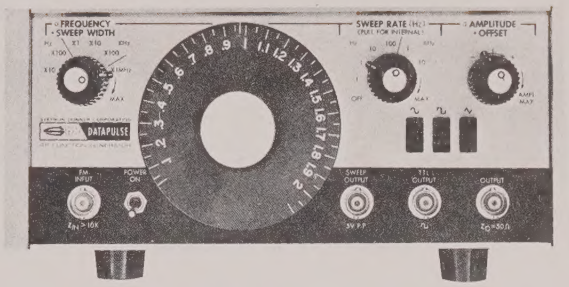
Models 400 and 411 Function Generators



Model 400

- Frequency range from 0.02 Hz to 2 MHz
- Accuracy better than 3%
- Distortion less than 1%
- 10 volts into 50 or 600 ohms
- 40 dB attenuation
- ±5 volt offset

The combination of engineering ingenuity, attractive ruggedized packaging, wide range specifications and low price make the Model 400 Function Generator the "best buy" on the market today for a general purpose source of sine waves, triangles and square waves. It has found instant, wide range acceptance in laboratories, schools, service shops and test facilities throughout the world.



Model 411

- Frequency range from 0.02 Hz to 2 MHz
- Built-in sweep capability
- Less than 1% distortion
- 1000:1 sweep ratio
- 40 dB attenuation from 10V into 50 or 600 ohms
- 5 volt p-p sweep output

Addition of an internal sweep generator to the popular, low priced Model 400 Function Generator has produced the Model 411 Sweep/Function Generator. You will not find a better buy anywhere in the world to fit applications requiring a swept source of high quality sine waves, triangles or square waves. The Model 411 is finding its way into laboratories everywhere.

SPECIFICATIONS

FREQUENCY

Range: 0.02 Hz to 2 MHz in six decade ranges (1% typical)

Accuracy: Better than ±3% of full scale

FREQUENCY MODULATION

Range: Greater than 1000:1

Sensitivity: <0 to >5 volts sweeps 1000:1

Input Impedance: Greater than 5 kΩ

MAIN OUTPUT

Waveforms: Sine wave, square wave and triangle

Sine Distortion: Less than 1% to 200 kHz. No harmonic greater than −30 dB to 2 MHz (measured between 0.2 and 2 on the dial at maximum amplitude)

Symmetry: Greater than 98% (between 0.2 and 2 on the dial)

Square Wave Transition Times: Approximately 50 nanoseconds

Triangle Linearity: Greater than 99% to 200 kHz (measured between 0.2 and 2 on the dial at maximum amplitude).

Amplitude: Greater than 20 volt p-p maximum, open circuit. 10 volts p-p maximum into 50 or 600 ohms.

Attenuation: Greater than 40 dB range, continuously variable

Impedance: 50 ohms (600 ohms by removing internal jumper)

DC Offset: Continuously variable from −10 volts to +10 volts, open circuit, independent of attenuator setting. Greater than ±5 volts,into 50 or 600 ohms. Combination of dc offset and signal limited to ±10 volts when terminated in 50 or 600 ohms.

SWEEP GENERATOR (Model 411 only)

Sweep Rate: 0.01 Hz to 10 kHz in 6 decade ranges.

Sweep Ratio: 1000:1

Sweep Output: 5 volts p-p, fixed (baseline at ground) with 600 ohm output impedance

Sweep Accuracy: Sweeps from low to high frequency with upper frequency set by dial. Accuracy is same as dial accuracy in non-swept mode

TTL OUTPUT: 0 to 2 volt square wave, TTL compatible

GENERAL

Power: 105-125/210-230 volts, 50 to 400 Hz. Approx. 20 watts

Dimensions: 3½"H x 8-3/8"W x 12-5/8"D (8.9 x 21.3 x 32.1 cm)

Weight: 7.5 lbs (3.4 kg) net; 10 lbs (4.5 kg) shipping

Price

Model 400: $295

Model 411: $450

Prices and specifications subject to change without notice. SD/USA—6/74

DATAPULSE DIVISION, SYSTRON-DONNER CORPORATION
10150 W. JEFFERSON BLVD., CULVER CITY, CALIFORNIA 90230 • Phone: (213) 871-0410 • TWX: 910-340-6766

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SECTION II

CONTROLS AND CONNECTORS

This section lists the front panel controls and describes their function.

2.1 POWER Selector

Applies ac voltage to the primary of the power transformer.

2.2 FREQUENCY Selector

Selects one of six overlapping decade frequency ranges.

2.3 FREQUENCY Dial

Continuously varies the frequency within the range selected by the FREQUENCY selector.

2.4 OFFSET Vernier

Adjusts the output waveform offset in either a positive or a negative direction.

2.5 AMPLITUDE Vernier

Continuously adjusts the amplitude of the output waveform. (For Model 411, the amplitude vernier is concentric with the offset vernier.)

2.6 SINE WAVE ∿ Pushbutton

Selects the sine waveform for output.

2.7 SQUARE WAVE ⊓ Pushbutton

Selects the square waveform for output.

2.8 TRIANGLE WAVE ⅄ Pushbutton

Selects the triangle waveform for output.

2.9 OUTPUT Connector

Main output for the sine, square, or triangle waveform. Output impedance is 50 ohms.

2.10 TTL OUTPUT Connector

Provides a > 2.5 volt peak square wave output with baseline at ground for synchronization purposes.

2.11 FM INPUT Connector

Provides input for external frequency modulation signal.

2.12 SWEEP CONTROLS (Model 411 only)

2.12.1 SWEEP RATE Controls

The sweep rate controls select the repetition rate of the sweep and selects internal sweep.

The outer switch selects the range. When it is rotated to the counterclockwise position the sweep circuit is turned off.

The vernier provides a continuous variation of repetition rate within the ranges.

The vernier is pulled out for internal sweep operation.

2.12.2 SWEEP WIDTH Control

The sweep width control is concentric with the FREQUENCY selector; it controls the range of the frequency swept.

The upper frequency is set by the main FREQUENCY Dial. The unit then sweeps up (from a

frequency determined by the SWEEP WIDTH control) for the frequency set on the dial.

2.12.3 SWEEP OUTPUT Connector

Provides a greater than 5 volt peak-to-peak ramp at the sweep rate (output impedance 600 ohms).

SECTION III

OPERATION

3.1 OPERATIONAL CHECK

The following procedures provide a brief operational check of the Model 400/411 Function Generator and an introduction to its controls.

NOTE: A half-hour warm-up period is required before the equipment will meet specifications.

3.1.1 Test Equipment Required

The following items of test equipment (or their equivalent) are required to perform functional operational checks on function generator performance.

a. Tektronix Model 453 Oscilloscope.

b. Systron-Donner Model 6151 Counter.

c. Systron-Donner Model 452 coaxial 2 watt termination.

d. Two coaxial cables with BNC connectors terminated. Systron-Donner Part Number 36000-157.

3.1.2 Output Waveform Check

The following check verifies that the function generators sine, square and triangle waveform circuits are functioning correctly.

a. Connect the oscilloscope vertical input to the OUTPUT connector through coaxial cable terminated in 50 ohms at the oscilloscope. Sync oscilloscope from the TTL OUTPUT connector.

b. Set function generator controls as follows:

Control	Position
POWER selector	ON
FREQUENCY selector	X100 kHz
FREQUENCY dial	2
OFFSET vernier	mid-point
AMPLITUDE vernier	maximum clockwise
SQUARE WAVE (⊓) pushbutton	actuate

NOTE: If evidence of distortion exists in the following steps, rotate AMPLITUDE vernier in a counterclockwise direction to reduce distortion.

c. Observe square wave. It should be ~10 V peak-to-peak.

d. Actuate triangle (∧) pushbutton. Observe triangular waveform. It should be ~10 V peak-to-peak.

e. Actuate sine wave (∿) pushbutton. Observe sine wave. It should be ~10 V peak-to-peak.

3.1.3 Frequency Check

The following is a check of the function generator's ability to supply outputs throughout the generator's specified frequency range.

a. Position function generator controls as follows:

Control	Position
POWER selector	ON
OFFSET vernier	mid-point
AMPLITUDE vernier	maximum clockwise
TRIANGLE (∿) push-button	actuate

b. Connect counter input to function generator TTL OUTPUT connector.

c. Set FREQUENCY selector to X1 MHz. Set FREQUENCY dial to 2. Observe counter indication and observe that frequency is 1.94 to 2.06 MHz.

d. Proceed to Table 3-1 and perform checks as indicated in accordance with procedure in steps (b) and (c). For frequencies of 1 kHz or less, use period measurements to minimize the time required and maximize the resolution for each measurement. Frequency/period tolerances are provided in Table 3-1.

3.1.4 Sweep Check (Model 411 only)

The following is a check of the instrument sweep operation.

a. Position function generator controls as follows:

Control	Position
POWER selector	ON
SWEEP RATE range	10 kHz
SWEEP RATE vernier	MAX

b. Connect SWEEP OUTPUT to oscilloscope vertical input through coaxial cable.

c. Observe ramp signal. It should be ~5 V peak-to-peak (starting at ground) with a repetition rate >10 kHz.

d. Rotate SWEEP RATE vernier fully counterclockwise. Observe that repetition rate goes below 1 kHz.

e. Check other ranges as in steps (c) and (d) using Table 3-2.

f. Position function generator controls as follows:

Control	Position
FREQUENCY selector	X1 MHz
FREQUENCY dial	2
OFFSET vernier	mid-point
AMPLITUDE vernier	mid-point
SWEEP RATE range	1 Hz
SWEEP RATE vernier	maximum clockwise
SWEEP WIDTH control	mid-point

g. Pull sweep rate vernier to enable internal sweep.

h. Set oscilloscope sweep rate to 5 μs per division. Observe main output on oscilloscope noting that frequency changes at the sweep rate. Observe that rotating SWEEP WIDTH varies the amount of frequency change.

Table 3-1. Frequency/Period Accuracy Check

Frequency Switch Position	Frequency Dial at 0.2		Frequency Dial at 2.0	
	Frequency	Period	Frequency	Period
X1 MHz	140 to 260 kHz		1.94 to 2.06 MHz	
X100 kHz	14 to 26 kHz		194 to 206 kHz	
X10 kHz	1.4 to 2.6 kHz	0.714 to 0.385 ms	19.4 to 20.6 kHz	51.5 to 48.5 μs
X1 kHz	140 to 260 Hz	7.14 to 3.85 ms	1.94 to 2.06 kHz	0.515 to 0.485 ms
X100 Hz	14 to 26 Hz	71.4 to 38.5 ms	194 to 106 Hz	5.15 to 4.85 ms
X10 Hz	1.4 to 2.6 Hz	0.714 to 0.385 s	19.4 to 20.6 Hz	51.5 to 48.5 ms

Table 3-2. Sweep Check

Range	Minimum	Maximum
10 kHz	<1 kHz	>10 kHz
1 kHz	<100 Hz	>1 kHz
100 Hz	<10 Hz	>100 Hz
10 Hz	<1 Hz	>10 Hz
1 Hz	<0.1 Hz	>1 Hz
0.1 Hz	<0.01 Hz	>0.1 Hz

NOTE: The lower ranges can be more rapidly checked by measuring the period and converting to frequency.

SECTION IV

CALIBRATION

4.1 EQUIPMENT REQUIRED

The following equipment (or equivalent) is required to perform calibration procedures on the instrument.

NOTE: A half-hour warm-up period is required before the equipment will meet specifications.

a. Tektronix Model 453 Oscilloscope.

b. Systron-Donner Model 6151 Counter.

c. Systron-Donner Model 452 coaxial 2 watt termination.

d. Two coaxial cables with BNC connectors terminated. Systron-Donner Part Number 36000-157.

4.2 ±15 V POWER SUPPLY CALIBRATION

a. Connect digital multimeter (Model 7004) test probe to TP5B.

b. Adjust potentiometer R~~517~~ 518 to obtain -15 V ±10 mV indication on digital multimeter.

c. Connect digital multimeter test probe to TP5A.

d. Adjust potentiometer R~~518~~ 517 to obtain +15 V ±10 mV indication on digital multimeter.

4.3 MAIN GENERATOR CALIBRATION

a. Set instrument controls as follows:

Control	Position
OFFSET vernier	mid-point
AMPLITUDE vernier	mid-point
SQUARE WAVE (⊓) selector	ON
POWER selector	actuate

b. Connect instrument OUTPUT connector through coaxial cable to oscilloscope vertical input; terminate cable in 50 ohm coaxial termination at oscilloscope.

c. Connect TTL connector to counter input.

d. Observe signal at TP3A. Adjust BIAS ADJ potentiometer R325 to center waveshape about ground level.

e. Set FREQUENCY selector to X1 MHz. Rotate FREQUENCY dial fully clockwise (lowest frequency). Adjust MIN FREQ ADJ potentiometer R10 for frequency of approximately 1 kHz (period of 1 ms).

f. Observing the square wave on the oscilloscope, adjust SYMMETRY ADJ potentiometer R15 as required to achieve 50% duty factor with settings as described in step (e).

g. Repeat steps (e) and (f) until frequency is approximately 1 kHz and duty factor is approximately 50%.

4.4 DIAL CALIBRATION

In the event that the FREQUENCY dial should become loosened, or if for any other reason the unit cannot be properly calibrated, it will be necessary to reset the FREQUENCY dial on its shaft in accordance with the procedure outlined in steps (a) and (b). If the dial has not loosened, start with step (c).

a. Set FREQUENCY selector to X1 kHz. Set LOW RANGE FREQ ADJ potentiometer R3 for a reading of 13.5 volts at the top of the FREQUENCY potentiometer R4 (point [C] on the board).

b. Adjust the dial for a reading (on the counter) of 200 Hz (5.00 ms period). Being very careful not to twist the dial, loosen Allen screws holding the dial and align the 0.2 mark with the index mark on the front panel. Recheck the frequency (period). If it has moved reset the dial until the observed reading is as close to correct as possible (a reading within ±1% should be attainable).

c. Maintain FREQUENCY selector at X1 kHz. Turn the FREQUENCY dial to 2.0. Reset the LOW RANGE FREQ ADJ potentiometer R3 for a setting as close to 2.0 as possible (a reading within ±1% should be attainable).

d. Turn the FREQUENCY dial to 0.2. If the reading is not within tolerance, repeat steps (b) and (c) until the required accuracy is obtained, then perform steps (g) and (h) in paragraph 4.3.

e. Set FREQUENCY selector to 10 kHz. Set FREQUENCY dial to 2.0 and adjust HIGH RANGE FREQ ADJ potentiometer R2 for a reading as close to 20 kHz as possible. In any case the reading should be between 19.4 and 20.6 kHz.

f. Repeat check of frequencies at both ends of dial for all ranges. Readings must be within the tolerances shown in Table 3 - 1 (Section III). If not, repeat steps (b) through (e). Note, that for measuring frequencies of 1 kHz or less, it is advisable to use period measurement to minimize the time required and maximize the resolution for each measurement. (Frequency/period tolerances are provided in Table 3 - 1.)

4.5 WAVESHAPE CALIBRATION

a. Observe signal at test point TP2A of sine shaper. Adjust GAIN ADJ potentiometer R381 for 10 V peak-to-peak output. Adjust waveform about ground level with DC ADJ potentiometer R376. Repeat adjustments until a 10 V peak-to-peak waveform centered about ground is obtained. (These adjustments interact.)

b. Actuate triangle (∿) selector. Set FREQUENCY selector to X10 kHz and FREQUENCY dial to 2.0. Set OFFSET control for symmetrical triangle waveshape centered about ground level.

c. Actuate square (⊓⊔) selector. Set SQUARE WAVE OFFSET ADJ potentiometer R350 for symmetrical square wave centered about ground level. (Set FREQUENCY selector to X1 MHz.) Adjust output amplifier trimmer capacitor C405 for pulse with slight overshoot.

d. Actuate sine (∿) selector. Set FREQUENCY selector to X1 kHz and adjust FREQUENCY dial for 2 kHz output. Connect OUTPUT connector to distortion analyzer. Adjust POSITIVE DISTORTION ADJ potentiometer R202 and NEGATIVE DISTORTION ADJ potentiometer R205 for minimum distortion.

4.6 SWEEP CALIBRATION
(Model 411 only)

a. Set instrument controls as follows:

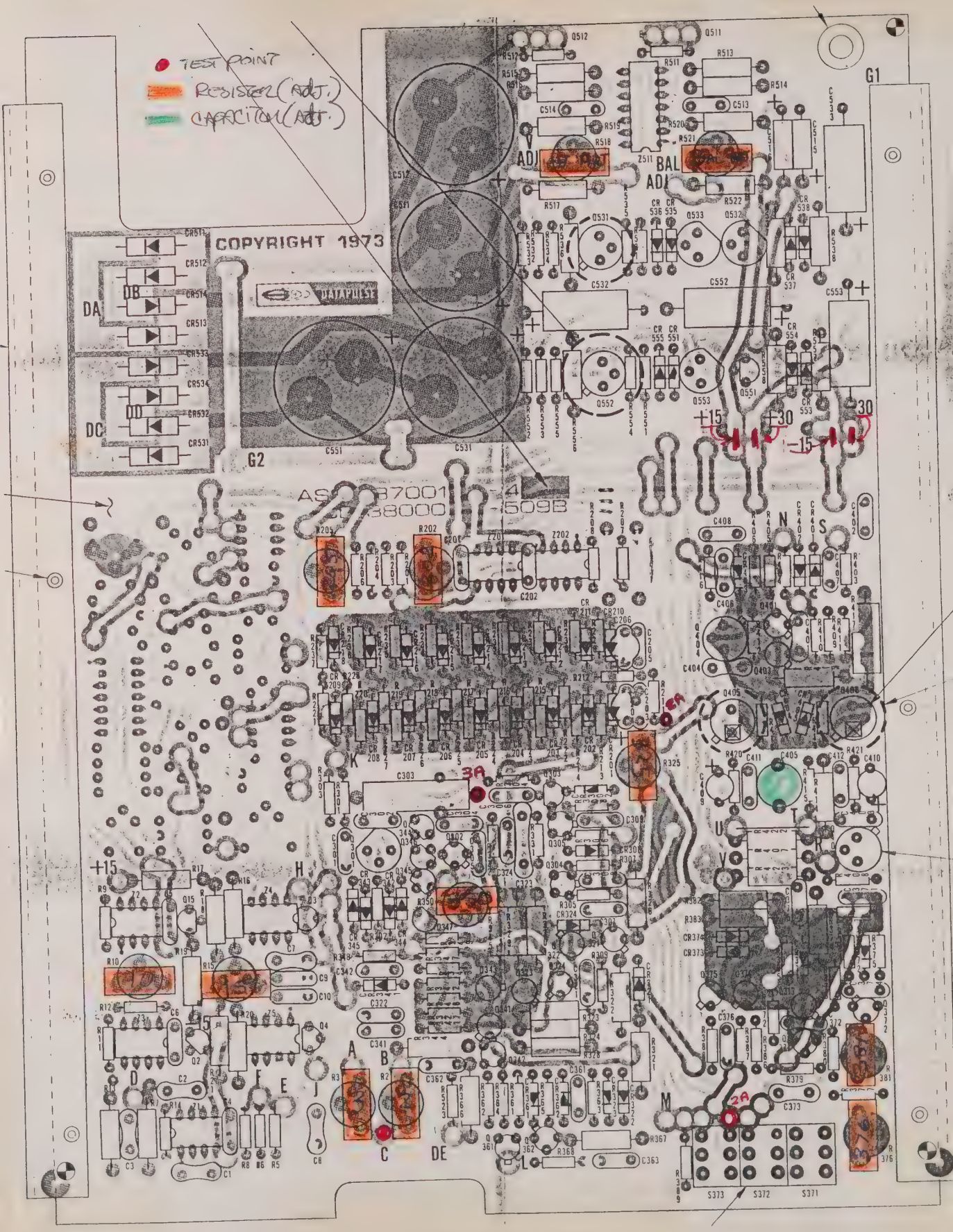
Control	Position
SWEEP RATE range	100 Hz
SWEEP RATE vernier	MAX

b. Set oscilloscope sweep rate to 2 SEC; set vertical sensitivity to 0.1 V per division. Connect X10 probe to point [BK] on circuit board or to center terminal of switch S602 (behind SWEEP RATE vernier).

c. Set sweep level adjust (R627) so that peak of ramp waveshape is at zero volts.

4.7 FINAL CALIBRATION

a. Place covers on instrument and allow instrument to warm-up (at least one-half hour). Check minimum frequency on X10 kHz range. If frequency exceeds 20 Hz with dial set fully clockwise (minimum frequency), readjust MIN FREQ ADJ R110 and SYMMETRY ADJ R15 as required. Recheck paragraph 4.5, step (a) through (d) and repeat the adjustments if necessary.


TEST POINT
REGISTER (ADJ.)
CAPACITOR (ADJ.)
COPYRIGHT 1973
DATAPULSE
V ADJ
BAL ADJ
+15
-15
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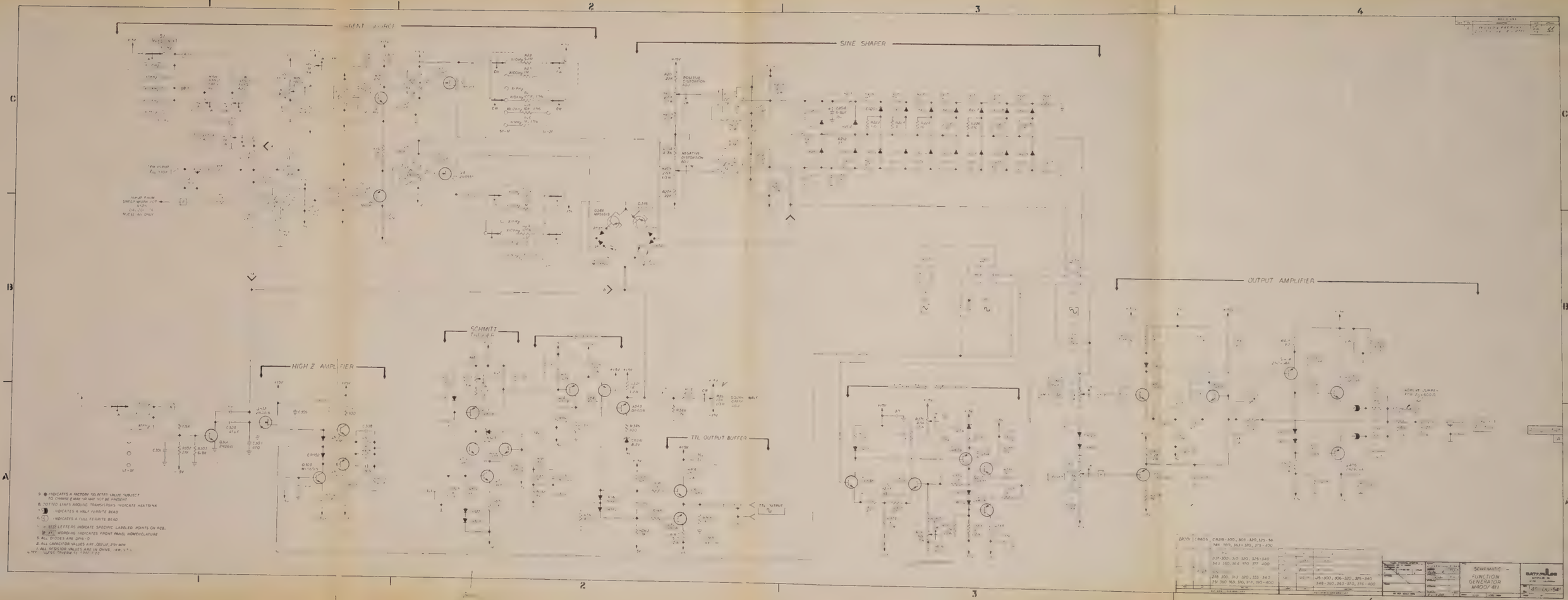
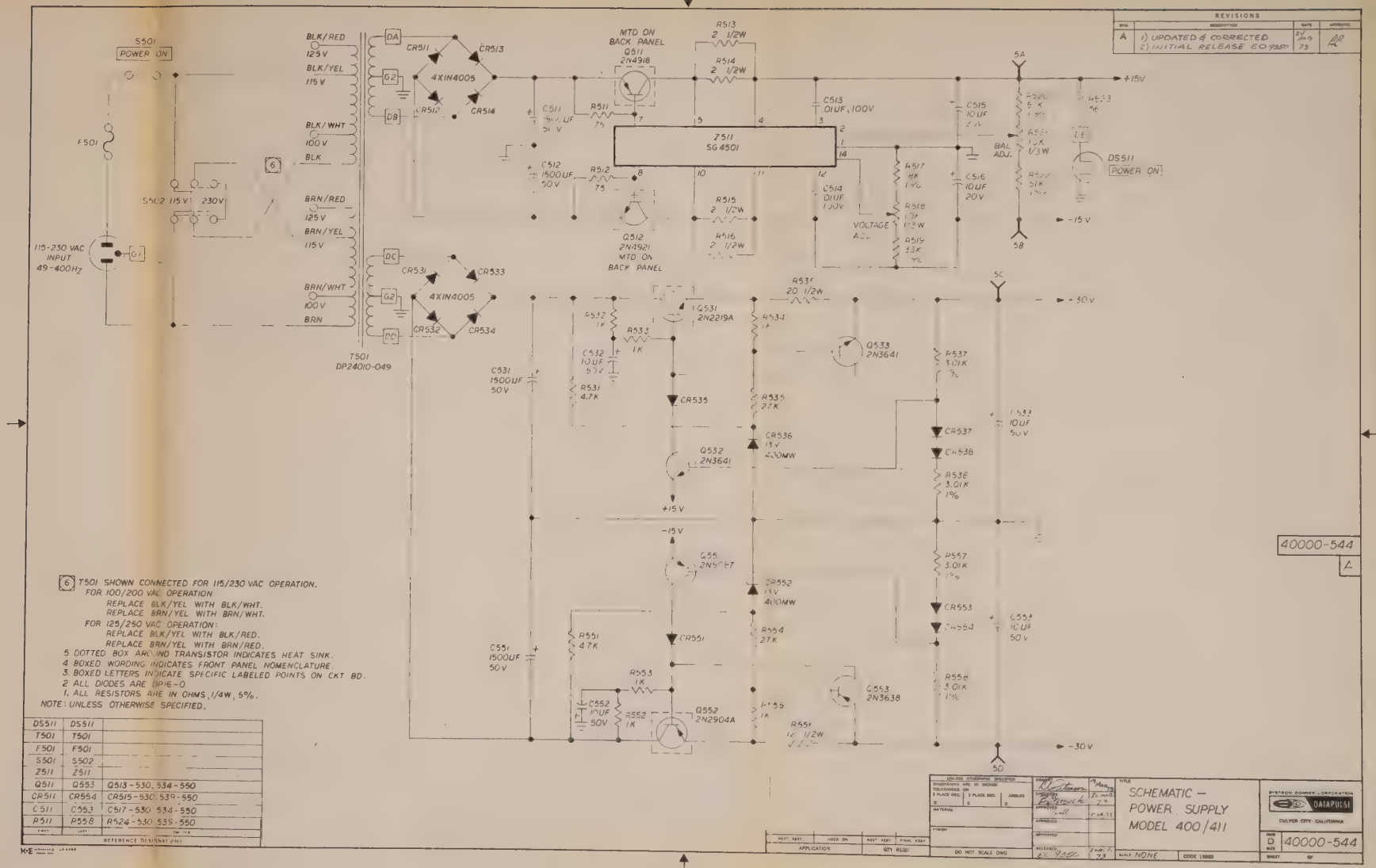
G1
G2
DA
DB
DC
DD
AS 37001
38000
509B
3A
2A


SINE SHAPER
SCHMITT
HIGH Z AMPLIFIER
TTL OUTPUT BUFFER
OUTPUT AMPLIFIER
FUNCTION GENERATOR MODEL 181



6 T501 SHOWN CONNECTED FOR 115/230 VAC OPERATION.
FOR 100/200 VAC OPERATION
REPLACE BLK/YEL WITH BLK/WHT.
REPLACE BRN/YEL WITH BRN/WHT.
FOR 125/250 VAC OPERATION:
REPLACE BLK/YEL WITH BLK/RED.
REPLACE BRN/YEL WITH BRN/RED.

5 DOTTED BOX AROUND TRANSISTOR INDICATES HEAT SINK.
4 BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE.
3. BOXED LETTERS INDICATE SPECIFIC LABELED POINTS ON CKT BD.
2 ALL DIODES ARE 1N916-D
1. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.

NOTE: UNLESS OTHERWISE SPECIFIED.

REFERENCE DESIGNATIONS		
DS511	DS511	
T501	T501	
F501	F501	
S501	S502	
Z511	Z511	
Q511	Q553	Q513-530, 534-550
CR511	CR554	CR515-530, 539-550
C511	C553	C517-530 534-550
R511	R558	R524-530 539-560

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVED
A	1) UPDATED & CORRECTED 2) INITIAL RELEASE EO 9350	2/20/73	LR

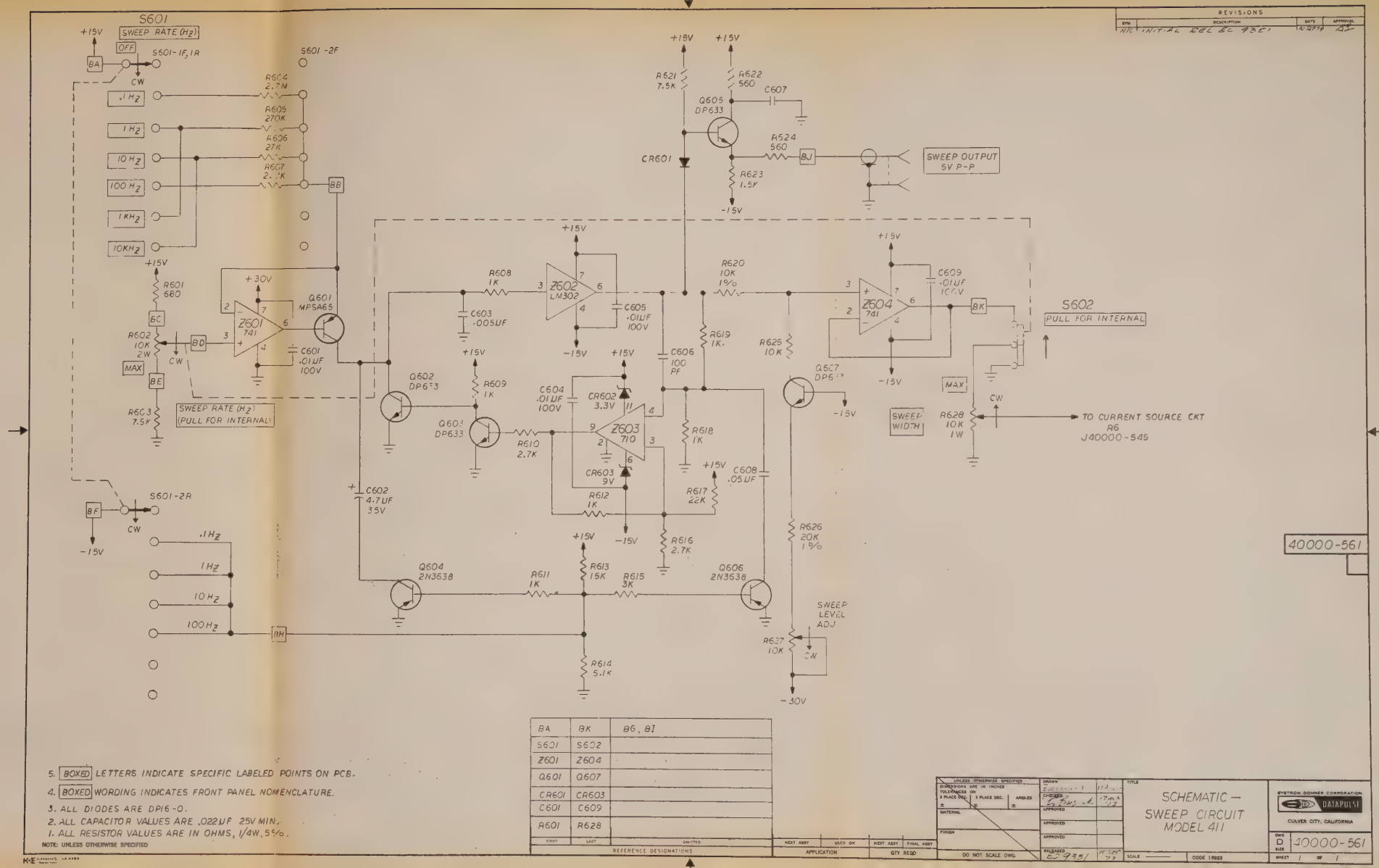
40000-544
A

SCHEMATIC — POWER SUPPLY MODEL 400/411

BYRON DONNER CORPORATION
DATAPULSE
CULVER CITY, CALIFORNIA

SIZE D | 40000-544

SCALE NONE | CODE 19663



BA	BK	BG, BI
S601	S602	
Z601	Z604	
Q601	Q607	
CR601	CR603	
C601	C609	
R601	R628	

REFERENCE DESIGNATIONS

5. BOXED LETTERS INDICATE SPECIFIC LABELED POINTS ON PCB.
4. BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE.
3. ALL DIODES ARE DPI6-0.
2. ALL CAPACITOR VALUES ARE .022UF 25V MIN.
1. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%.

NOTE: UNLESS OTHERWISE SPECIFIED

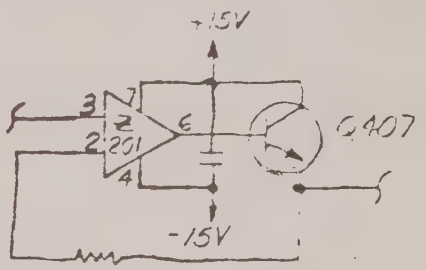
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL REL EC 9351	4/7/73	

SCHEMATIC — SWEEP CIRCUIT MODEL 411

BYSTRON DONNER CORPORATION
DATAPULSE
CULVER CITY, CALIFORNIA

DWG D 40000-561
SIZE
SHEET 1 OF 1

E. O. NO.	EFFECTIVE DATE	DWG. NO.	CHANGE
4502	8-28-73	40000-544	Change R520 and R522 from 51 k, 1% to 4.99 k, 1%, P/N10710-502. Change R521 from 10 k, 1/3 W, P/N10231-103 to 1 k, 1/3 W, 20%, P/N10231-102. Change R517 from 18 k, 1% to 15.9 k, 1%, P/N 10750-163. Change R519 from 33 k, 1% to 30 k, 1%, P/N10750-303.
4524	9-20-73	40000-545	Change R321 from 402 ohms to 332 ohms, ¼ W, 1%, P/N10710-331. Add one DP16-0, P/N22164-000 in series with CR321.
		40000-561	Change R603 from 7.5 k to 8.2 k, ¼ W, 5%, P/N 10010-822. Change R616 from 2.7 k to 2.4 k, ¼ W, 5%, P/N 10010-242. Add one 68 pF Dip Rad capacitor, P/N11077-680 from Sweep Output BNC to Ground (on front panel).
4542	10-4-73	40000-545	Change C407 from 0.022 F, 25 V, P/N11241-223 to 0.01 F, 100 V, P/N11243-103.
4546	10-5-73	40000-545	Change part number of Q3 from 2N5461, 12605-000 to DP700, 22705-000.
4561	10-16-73	40000-545	Indicate clockwise position toward point S on R402.
4613	12-5-73	Manual	Section IV, paragraph 4.2: In step (b) change R517 to R518 and in step (d) change R518 to R521.
4588	11-13-73	40000-544	Change C303 from 0.47 µF, 250 V, 20%, P/N11134-474 to 0.47 µF, 250 V, 10%, P/N11114-474. Change R519 from 30 k, 1%, 1/4 W, P/N10750-303 to 25.5 k, 1%, 1/8 W, P/N10690-253.
611	4-16-74	40000-545	Remove C372, 22 pF, 500 V, 5%, P/N11077-220.
9416	9-5-74	40000-545	Change R325 from 500 ohm, 1/3 W to 200 ohm, 4-turn, P/N102074. Add R424, 221 ohm, 1%, P/N102190 in parallel with R325. [redacted] Change Q321 from DP608 to 2N4121, P/N 102713. Change R201 and R206 from 22 k, 1/4 W, 5% to 27 k, 1/4 W, 5%, P/N101587, Delete R209 and R210, 620 ohm, 1/2 W, 5%.

E. O. NO.	EFFECTIVE DATE	DWG. NO.	CHANGE
9416 (cont.)			Add Q407, 2N3904, P/N101377 to output of Z201 and add Q408, 2N3906, P/N 101378 to output of Z202 except collector is tied to -15 V per following example:  Change R221 and R237 from 33 ohm, 1/4 W, 5% to 27 ohm, 1/4 W, 5%, P/N101729.

DATAPULSE DIVISION
SYSTRON DONNER

SEMICONDUCTOR REPLACEMENTS
(Applicable to all Datapulse Models except the Model 102.)

SERVICE BULLETIN 1-65
Revised 8-13-73

The listed commercial diodes and transistors may be suitable replacements for the corresponding Datapulse parts, either as direct substitutes, or as selected for the special performance characteristics given. In certain cases, it may be necessary to use the Datapulse parts.

DATAPULSE TYPE NO.	DATAPULSE PART NO.	COMMERCIAL EQUIVALENT
Diodes:		
DP15-0	22154-000	1N752A selected for $\Delta V < 0.2$ V between 7 mA and 110 mA.
DP15-1	22154-001	Same as DP15-0 but matched in pairs to within 0.1 V.
DP15-201	22154-201	1N936 selected for 9.4 V $\pm$0.1 V @25 mA.
DP16-0	22164-000	1N3600
DP16-1	22164-001	(>80 V, DP16-0)
DP19-0	22194-000	1N2070/1N4005
DP19-6	22194-006	1N2071/1N4005
Transistors:		
DP46-1	22465-001	Selected for h_{fe} = 100 min.
DP59-0	22595-000	2N2904A
DP60-1	22605-001	2N2894 selected for V_{ceo} (sust) = 20 V min.
DP60-2	22605-002	2N3133
DP60-4	22605-004	2N3209
DP60-5	22605-005	FT1702
DP60-6	22605-006	2N3640
DP60-7	22605-007	2N2894 selected for V_{ceo} (sust) = 25 V
DP60-8	22605-008	2N2894A (Motorola) V_{ceo} >20
DP63-2	22635-002	Replaced by DP63-3
DP63-3	22635-003	2N2369A (Fairchild) h_{fe} ~70
DP63-4	22635-004	Replaced by DP63-3
DP63-6	22635-006	2N2219A
DP63-8	22635-008	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V
DP63-9	22635-009	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V
DP64-0	22645-000	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V

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